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ABSTRACT

If what is known about selective processes of perception is coupled with awareness of the extremely rapid pace of classroom interaction, the classroom setting becomes one in which differential teacher expectations are likely to be formed and maintained. In fact, research findings reveal the power of teacher expectations: high teacher expectations can increase student achievement and low expectations can actually decrease achievement. Attempts to alter the communication of differential expectations by retraining teachers have generally been successful, but have been found to be quite expensive. Student achievement is also influenced by class size. Research findings indicate that a student achieving at the 50th percentile in a class of 40, if instructed in a group consisting of 1 to 5 students, is likely to achieve at the 83rd percentile or higher. Because this achievement effect is specific to groups of 20 pupils or less, a "student threshold for achievement" concept of facilitative student-teacher interaction is supported. It is possible that in classes of 21 to 40 pupils, fewer students' thresholds for achievement are reached by teachers due to the much wider distribution of interaction. There are several procedural methods for equitably distributing interaction that teachers can use (1) to counter the reluctance of peripherally seated students to initiate interaction, and (2) to compensate for teacher expectancy behaviors. (Directions for further research are suggested.) (RH)

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GALATEA IN THE CLASSROOM:

THE DISTRIBUTION OF TEACHER-PUPIL INTERACTION AND ITS RELATIONSHIP TO CLASS-SIZE

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GALATEA IN THE CLASSROOM:
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Darwin's concept of natural selection, tersely expressed in the phrase, "the survival of the fittest" has made an extraordinary impact in fields outside biology. Its threads now are the strongest in the fabric of popular American philosophy. The idea that the strong are worthy to survive and the weak are not informs our cultural perspective to the degree that otners' failure in competitive realms need not concern us very much--it is only final proof that the person, corporation, ideal, institution was not fit to survive anyway. We find this idea even in our educational systems. Low achievers in our schools are not fit for further education or effort. We do not grieve--we are satisfied, after all, the pattern of the world is simply fulfilling itself--we expected some not to survive.

The error in this line of thought is that it confuses "fit" with "good". The concept of "fit" has no foundation in a value system. We know something is fit only if it survives, otherwise it is not fit. This is a crabgrass mentality. As any who have tended a lawn know, crabgrass is exceedingly fit--much more so than the grass we so tenderly cultivate. We don't call crabgrass good because it is fit, on the contrary, we fight it more vigorously because it is fit and we have a "good" that we care about--green grass.

The concept of "good", on the other hand expresses a positive evaluation. Sometimes the good may not necessarily be fit. The good in this case will require nourishment and careful husbandry. This applies in the realm of education.

A clamor rose in education with the publication of Pygmalion in the Classroom, (Rosenthal & Jacobson, 1968). This work suggested that a teacher's expectations of her students strongly influenced the fitness of the student for achievement. Pygmalion, the mythical King of Cyprus, sculpted a beautiful statue that the goddess Aphrodite brought to life for him. Hence the reference to Pygmalion in the title of the book. The idea was that teachers create images of students as high or low achievers that students, through conditioning in the classroom, eventually fulfill. As long as a student's fitness for educational survival, that is high or low ability to achieve was attributed to uncontrollable causes, parents and teachers alike were satisfied to remain confused about "fit" and "good". Now, with teacher's expectations of students seen as plausible shapers of student fitness, the lid has been blown off; "Is this student's low achievement due to low ability or to the teachers conditioning toward that end?" At this point in time research offers an answer to this question, according to Thomas L. Good:

> Research on teacher expectation effects has been successful in demonstrating that some low (achieving) students receive teacher behavior that, at a minimum, sustains poor performance and that in some cases seems to worsen or lower academic performance.
> (Good, 1980, p. 118.)

However this "Pygmalion effect" is a two edged sword, and hence the title of this paper, "Galatea in the classroom". Galatea was the name given Pygmalion's beautiful sculpture turned woman. In our version of story, the surprisingly powerful fact is that high teacher expectations can increase the achievement of the average student as much as one standard deviation (McDonald & Elias, 1976)! Teachers do

have influence to shape students into more powerful achievers. Galatea can again come to life--right in the classroom.

At this point if we are concerned only for observing what we already assume to be true--the survival of the fittest, we will have no interest in asking how this "Galatea effect" can be cultivated. We are like those content with crabgrass. On the other hand, if we envision the possibility and value of all children learning to a high standard, we will seek ways to make the Galatea effect operative in every student's experience. This paper is an attempt to suggest avenues of inquiry toward this end.

THE FORMATION OF TEACHER EXPECTATIONS

Bassett and Smythe (1979) suggest that, in accordance with what is known about human perception, teacher expectations of student achievement are formed by highly individualized yet systematic perceptual processes.

All people make choices about which of the available stimuli they allow to enter their perceptual world. Based upon initial contact with a new student, a teacher may curiously check the past records of a few students closely for any number of reasons. These extra data on past performance, either high or low; work upon the formation of expectation for these students. This is an example of selective exposure at work. The teacher actively, if unconsciously, determines what particular exposure she will have.

Generally, people attend to stimuli in short periods averaging 17 seconds. However, we are likely to pay attention to people and things

we like for longer periods of time. The distortion inherent in this process with respect to classroom interaction is obvious. Students who are irritants or who require extra work are likely to get less attention than those who sparkle with answers and involvement. This is the process selective attention at work.

With those people, behaviors and events that do gain our attention, we selectively attach specific meaning. These meanings are highly individualized and may bear no relationship with meanings intended by others. This is the phenomenon of selective perception. Our perceptions of other's behavior are colored by our desires, and values.

We tend to rewrite our own versions of history. The fisherman's morning catch grows at least a few niches by nightfall when the story is recounted. This is selective retention at work.

If we couple these selective processes with the incredible pace of interaction in the normal class, we have a setting where differential teacher expectations are likely to form and maintain themselves. Jackson (1968) found that a teacher may engage in over one thousand interactions per day with students. Adams and Biddle (1970) found between 1200 and 4500 activity episodes per day in school classrooms. This pace vitually insures that a teacher can not spend a lot of time with individuals. This necessitates rapid unchecked interpretations by teachers.

There are also very few occasions for experience with a student that would change teacher expectations once they are found. Adams

and Biddle found that teachers (1st, 6th and 11th grades) spent an average of 8% of their time visiting with students on an individual basis. Spread this over a regular school year, and it averages out to less than two and one half hours per pupil per year in a class of 30 students. This is not very much.

Though influences have been identified in the formation of expectations, (Tversky and Kahneman, 1971; Brophy and Good, 1974; Brophy and Evertson, 1976) little is known about how these expectations are formed in particular. Three observations do hold across most cases; (1) The expectations are present, both high and low; (2) They are formed early in the relationship of teacher and student; and (3) These expectations are quite stable.

THE MEDIATION OF TEACHER EXPECTATIONS

It is most plausible that teacher expectations are communicated to students through behavior in the classroom. The research of Rosenthal (1974); Good and Brophy, (1978); and Braun, (1976) among others supports this assertion.

If the classroom is the site where teacher expectation is communicated to students, we may presume that the teachers themselves are active, if unconscious, communicators of this influence. Generally, teachers are directly involved in 80-90% of classroom interactions observed by researchers (Adams & Biddle, 1970).

Teacher behaviors that have, at various times, been found to mediate teacher expectations are:

1. Seating low students farther away from the teacher or in groups.
2. Paying less attention to lows.
3. Calling on lows less often.
4. Waiting less time to answer questions.
5. Not staying with lows in failure situations.
6. Criticizing lows more frequently.
7. Praising lows less frequently.
8. Praising lows more frequently for marginal or inadequate response.
9. Providing lows less accurate and detailed ~~feedback~~ cues.
10. Failing to provide lows with any ~~feedback~~ ~~cues or~~ explanation or direction.
11. Demanding less work effort from lows.
12. Grouping students according to expected achievement levels.

The reverse of these behaviors would hold true for high achieving students, (Good, 1980).

Good and Brophy (1980) estimated that one-third of teachers observed in research on teacher expectancies interacted with students in ways that actually increased student achievement deficiencies. A second group of teachers communicated differential expectations, allowing high achieving students to dominate class time but not as severelyas the first group. A third group of teachers which Good termed "proactive" did not allow expectation for low achieving students to interfere with attempts to teach them. These teachers found ways to increase time and attention given to lows while not ignoring the need of the class as a whole.

ATTEMPTS AT RETRAINING TEACHERS

These ideas suggest that perhaps teachers ought to be retrained, made aware of expectancy processes and encouraged to change. Martin (1973); Cooper (1978); and Good and Brophy (1980) have observed attempts at altering teacher expectation communication through training. The evidence indicates that, on the whole, teachers do change their behavior significantly. However some teachers seem impervious to this retraining while others accept it eagerly.

Dissertation research, Beam (1972), Woodley (1971) and Efron (1976) tends to confirm these positive but qualified results. It is noteworthy that retraining procedures, in addition to achieving qualified results, are also quite expensive.

Efron's work (1976) at Harvard, 605 pages of dissertation material, resulted in some very provocative conclusions. His training of high school teachers over a period of three years, not only emphasized developing quality interactions but also emphasized the distribution of both quantity and quality interactions across all expectancy groups.

Here are two of his most intriguing sets of conclusions. First, uniform teacher behaviors across high and low expectancy groups are insufficient for meaningful impact upon uninvolved, low achieving students. Teachers must reach "threshold" levels of supportive interaction before low students respond. Surpassing the "threshold" required "reaching out," that is, special distributive behavior from teachers. Below the threshold, student attitudes were affected.

Above the threshold,student interaction patterns and achievement levels changed toward the positive.

Second, while teachers retained "quality of interaction principles" learned in the training process at a high level over a year's time, the "distribution of interaction principles" expressed in reaching out behavior deteriorated. Distribution of interaction was difficult for teachers to learn, while quality of interaction was easier.

The concept of a threshold of achievement-supportive interaction evidenced in Efron's research is an important one. Furthermore, his conclusion that "reaching out" behaviors, the distributions of interaction, are critical in getting beyond the threshold is a stimulating one. Further research, based upon his work, should be undertaken.

THE EFFECTS OF CLASS-SIZE

Recent research (unpublished at this time) by J. Ananias at the University of Chicago suggests that tutoring, in comparison with conventional group instruction, can account for almost two standard deviations of achievement above the group mean. The tutors used were trained with respect to content, but not process. Still, the effect was observed. Some of this was one to one tutoring and some was one to three tutoring.

This, of course, represents the ultimate in class size reduction and intensity of instructional interaction. But it does raise two interesting questions. If such a large effect size is

generated even when tutors are untrained as to methods, how many students can be tutored at one time with such a strong effect? Second question: Is there anything special about the interaction in tutoring that does not show up in analysis of conventional group instruction?

In answering the first question, statistically normal data easily generates a base line. Using the Z-score method on a normal distribution, 4.56% of the top scores will yield a two-sigma mean. These are scores of 1.69 sigma and above. This means that approximately 4½% of any normal group will be achieving, so as to produce a mean two sigmas higher than the whole group mean. This 4½% effect will evidence itself, assuming, that is, normality and a large enough group. This is a base from which to consider other influences as they reach 2 sigma effectiveness.

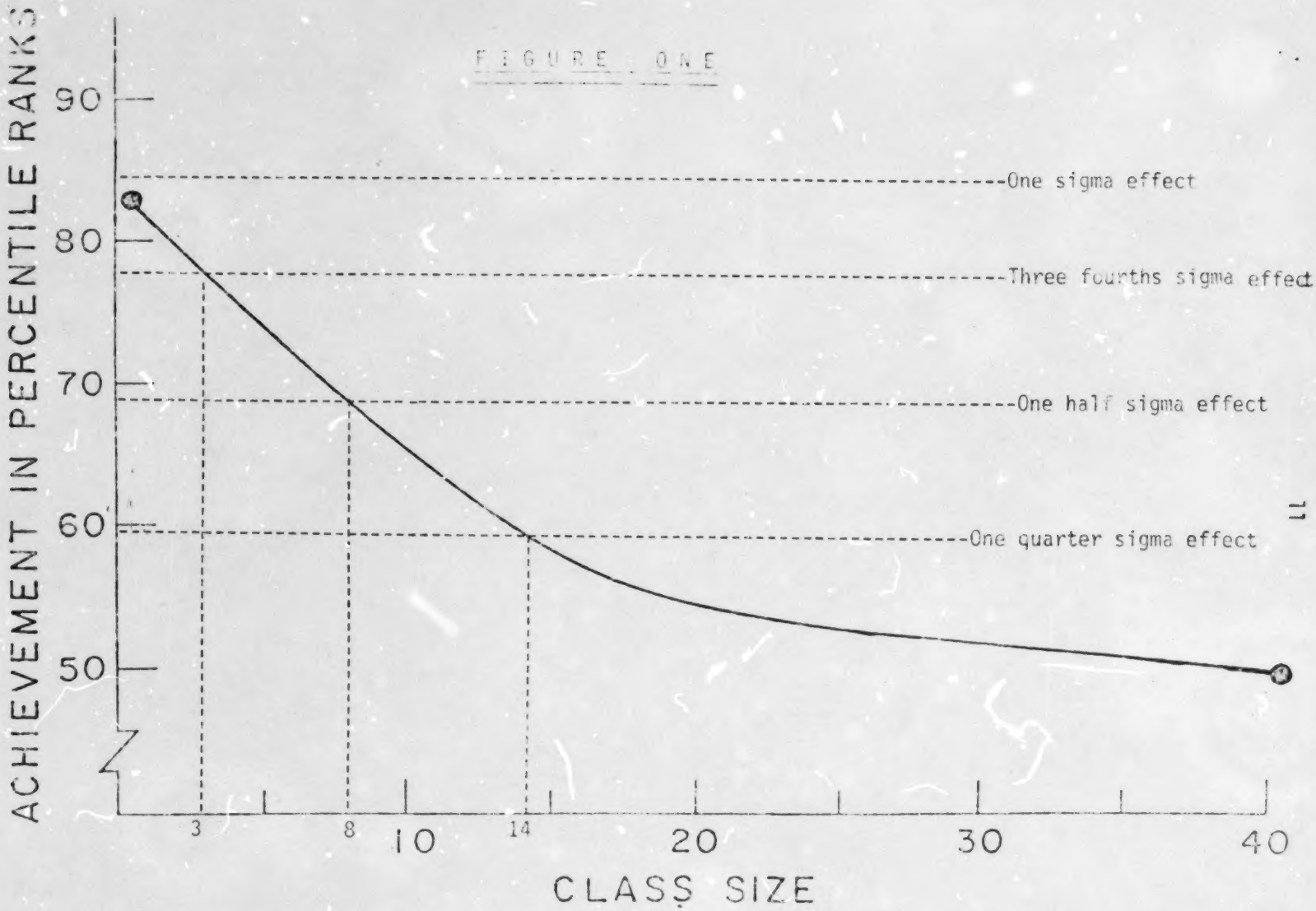
Though there have been a number of studies summarizing the relationship of class-size and student achievement as inconclusive (Porwell, 1978; Laughlin, 1976; Ryan & Greenfield, 1975), Gene Glass and Mary Smith (1978) using a powerful technique have made bold assertions regarding class size and student achievement research. Over the range of class size from large (forty pupils) to individualized instruction (one pupil), research indicates that there is one standard deviation of effect to be gained. Another way to put this is to say that an average student (50th percentile) in a class of forty students, if instructed in a group from 1 to 5 students, is likely to achieve at the 83rd percentile or higher. This small group effect is not adequately

shown on the regression curve in figure one. When class-size-equal-to-one studies (about twenty studies) were removed from the data set, the curve was even steeper, representing gains greater than one standard deviation. Glass and Smith concluded there is little doubt that, other things equal, more is learned in smaller classes. Some number less than twenty can more easily be taught with the high "tutoring" effect about which we have inquired.

An interesting pattern lies embedded in Glass and Smith's analysis of the data. It can be immediately discerned by calling attention to the different slopes of the regression curve in the ranges of 1-20 pupils and 21-40 pupils. A few quick calculations reveal that the rate of effect change in the 1-20 pupil range is <u>eight times as great</u> as in the 21-40 pupil range. Something different is happening in these two ranges (see figure two).

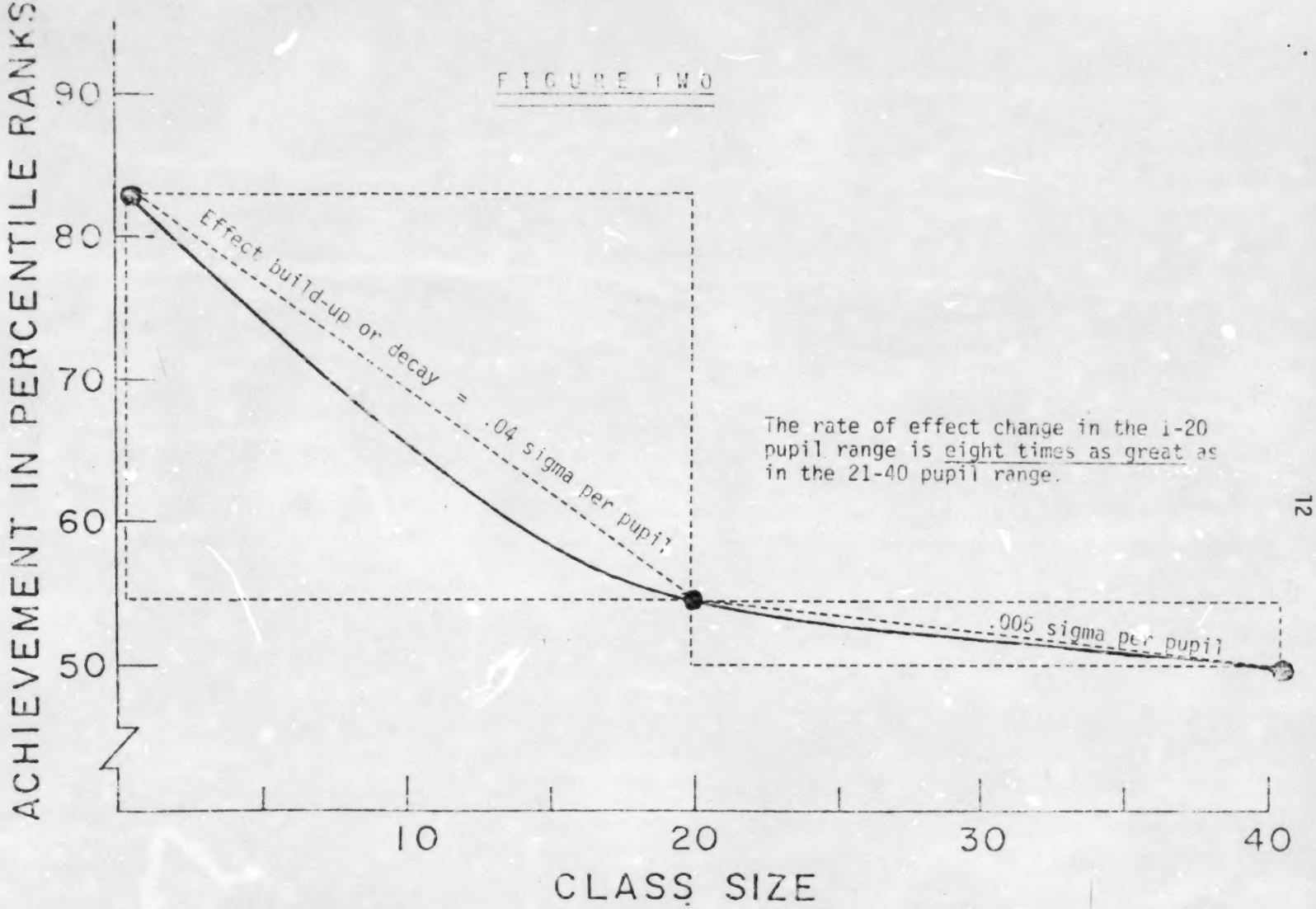
There is a sizeable achievement effect in the 1-20 pupil range unaccounted for in comparison with the 21-40 pupil range. Lets look at this carefully. Over the 21-40 pupil range there is $\pm$ .1 sigma effect change. If we take this as the standard effect for halfing the class-size and therefore doubling the potential magnitude of teacher-student interaction ($40 \longrightarrow 20 = +.1\sigma$; $20 \longrightarrow 10 = +.1\sigma$; $10 \longrightarrow 5 = +.1\sigma$; $5 \longrightarrow 2.5 = +.1\sigma$; $2.5 \longrightarrow 1 = +.12\sigma$; total $= .52\sigma$) approximately one half sigma of effect remains unaccounted for. This pattern is consistent with a "quantum" or "threshold" concept of achievement-supportive interaction, rather than a continuous model. This is to say that in the 1-20 pupil range, a much greater proportion of

FIGURE ONE



Consistent Regression Lines for the Regression of Achievement (Expressed in Percentile Ranks) onto Class-size for Studies That Were Well-controlled. This chart is adapted from one in Glass(1978)

FIGURE TWO



The rate of effect change in the 1-20 pupil range is eight times as great as in the 21-40 pupil range.

Consistent Regression Lines for the Regression of Achievement (Expressed in Percentile Ranks) onto Class-size for Studies That Were Well-controlled. This chart is adapted from one in Glass(1978)

students' thresholds of achievement-supportive interaction are being surpassed through the distribution of teacher-pupil interaction than in the 21-40 pupil range. The students who are "turned on" by the passing of threshold account for the extra one-half sigma of mean group achievement. In the larger classes (21-40 pupils), more students remain in the "turned off" state, below threshold, due to the much wider distribution of interaction.

It is this moment of "turning on" students that is the modern fulfillment of the Pygmalion myth--Aphrodite touches Pygmalion's statue and brings it to life as Galatea. Teachers touch students' lives and at a certain level of achievement-supportive interaction surpass the "Galatea threshold" resulting in increased student participation and achievement.

If Glass and Smith's data are correct, we may account for eight fold difference in the rate of achievement effect change with respect to class size by positing a threshold phenomenon relating the distribution of teacher-pupil interaction with achievement. (I know I've gotten myself out on a limb here, but a simple continuous phenomenon cannot produce the bent curve Glass and Smith found; a threshold model will. In any case, the limb may break, and down I'll go, but at least I'm out there where the fruit is usually found!)

Perhaps this is the secret of Marva Collins and those of her ability. They make a class of thirty achieve like a class of three by intuiting and surpassing each child's "Galatea threshold" of achievement-supportive interaction.

The second question brought to light by a consideration of class-size asks: Is there anything special about the interaction in tutoring that does not show up in conventional group instruction?

One study under the sponsorship of Arno Bellack has considered this (Nevjahr, 1970), and the conclusions are again provocative. The study deals with sixth graders studying mathematics, social studies and science for a period of one week. Video tapes of the individualized sessions were analyzed. When the data was compared with similar analyses of conventional lecture-discussion classes, a number of strong differences became evident. Students made far more initiating moves. They do 50% of the structuring and 24% of the soliciting. The teacher does 50% more responding. On the whole 55% of the interactions were initiated by the pupil. This is at least double the practice in conventional group settings.

Another interesting finding of this study indicated that only 18% of the interactions communicated about the subject matter. 82% of the interactions deal with such matters as assignments, materials and what pupils should do--that is instructional matters.

What is suggested by this research is that the pattern of interaction is different in individualized settings, as compared with group instruction. No comparison of achievement was undertaken. With relationship to Nevjahrs' work, it is interesting and worthy of note that another study (Grant, 1971) indicated that students showed an acute awareness of the interaction in their classrooms, highly favoring Flanders' categories 3 and 9, that is, "Teacher accepts or uses ideas" and "student initiated talk."

THE DISTRIBUTION OF TEACHER-PUPIL INTERACTION

We have already discussed the current state of research indicating that in conventional group instruction, the distribution of both achievement-supportive and achievement-inhibitive teacher-pupil interaction is made in accordance with teacher expectations. This creates, in strong cases, a sort of self fulfilling prophecy. Parenthetically, this research is not as new as one might think--I found a Columbia University Ph.d. dissertation entitled, "Distribution of opportunity for participation among various pupils in classroom recitations." When was it completed? 1914! (Horn, 1914).

It must be noted that with respect to distribution of interaction, the strong teacher expectation behavior that has been observed seems to be a cultural phenomenon. Cummings (1980) in Education and Equality in Japan cites how Japanese classrooms, which typically have 40 students and a single teacher, have an extraordinary level and equitable distribution of interaction. Most Japanese teachers have the goal of eliciting at least one act of participation from each student each hour. In one observed case, a teacher of math solicited 84 individual verbal presentations in 45 minutes. Each student spoke at least twice!

One further set of research conclusions ought to be mentioned in a consideration of distribution of interaction in the classroom. This is the "action zone" material. This term, the action zone was coined by Adams and Biddle (1970), when their extensive video tape analysis of 32 lessons in grade 1, 6, and 11 turned up the astounding

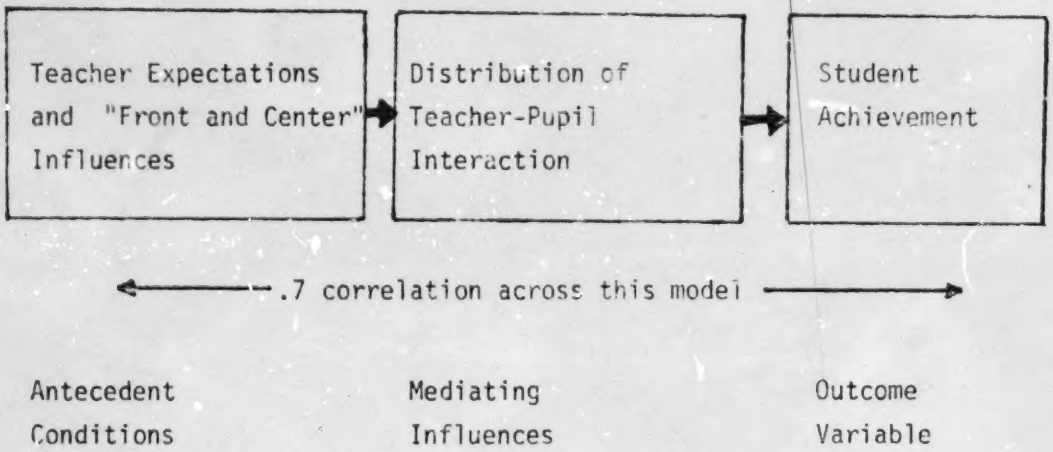
fact that virtually all 1176 student initiated interactions came from a specific physical location in the class room. This area, labeled the action zone was front and center in the classrooms observed. Though some subsequent studies, notably Bates (1973), Delefes and Jackson (1972) have not found the specific action zone, Carol Weinstein (1979) in her review of the research indicates that there are enough studies with positive results, especially Becker et al, (1973); Koneya (1976); Schwebel and Cherlin (1972) providing sufficient evidence to support the general notion of a front and center phenomenon.

Generally, research indicates that interaction in the classroom is distributed unevenly in accordance with teacher expectations and the front and center phenomenon resulting in a differential achievement effect. The model in figure three illustrates this.

PROCEDURAL INTERVENTIONS IN THE DISTRIBUTION OF TEACHER-PUPIL INTERACTION

Qualified success has been achieved in the training of teachers away from the negative effects of expectancy behavior. This training is an expensive proposition. Might there be some procedural methods to accomplish the same ends? That is, is there a way to put the distribution of interaction on an equality basis, taking it away from the antecedent conditions of teacher expectations and action zone influence? These types of procedures, simple, easily incorporated in the classroom and inexpensive, fall into two categories, (1) geographical and (2) transactional. The following procedures

FIGURE THREE



represent the wide range of possiblities.

I. Geographical Procedures to compensate for front and center Phenomenon.

A. Randomly change seating more often.

B. Make 2, 3, or 4 walls of the class room "front" creating a new action zone for each wall used as front.

C. Place low achieving students in action zone.

II. Transactional procedures to compensate for teacher expectancy behaviors.

A. Have a set or random (not pseudo random!) sequence for calling upon students for participation.

B. Create score apparatus to keep track of students initiating interaction and rule that every student must initiate an interaction before other students get a second chance.

C. Teach to a specific row or column each day, not telling students which row or column.

SUGGESTIONS FOR FURTHER RESEARCH

The following topics should attract more research effort: (1) Efron's work on the possibility of a threshold effect in teacher-pupil interaction distribution; (2) The comparison of interaction patterns in tutoring and conventional classrooms; (3) Phenomenological study of T. Good's "proactive teachers"; (4) The relationship of interaction pattern and class-size; (5) The relationship of action

zones effects to class-size; (6) The comparison of the impact of class-size on low and high achievers. This last study would be very helpful in getting at a possible threshold concept.

CONCLUSION

There is one sigma of mean student achievement to be gained through altering the distribution of teacher-pupil interaction. I estimate that probably only one half of this effect can be mobilized easily or inexpensively.

The reduction of class-size can result in one sigma of mean student achievement (perhaps as high as two sigmas). Confirming or disconfirming the nature and features of a hypothetical threshold phenomenon of achievement-supportive interaction might be one approach to further understanding the influence of teacher-pupil interaction upon student achievement.

REFERENCES

Adams, R.S. & Biddle, B.J. Realities of Teaching. New York: Holt, Rinehart and Winston, 1970.

Basset, R.E. and Smythe, M. Communication and Instruction. New York: Harper & Row, 1979.

Bates, R.J. Classroom location, learning and status. New Zealand Journal of Educational Studies, 1973, 8, (2), 142-155.

Beam, J.K. The effect of interaction analysis training and feedback on aspects of science teacher classroom intentions, perceptions and behaviors (Doctoral Dissertation, S.U.N.Y. Buffalo, 1972). Dissertation Abstracts Int'l. 1972, 33, (3A), 1036.

Becker, F.E., Sommer, R., Bee, J., & Oxley, B. College classroom ecology. Sociometry, 1973, 36, (4), 514-525.

Braun, C. Teacher expectation: Socio-psychological dynamics. Review of Educational Research, 1976, 46, 185-213.

Brophy, J. & Evertson, C. Learning from Teaching. Boston: Allyn & Bacon, 1976.

Brophy, J. & Good, T. Teacher-student relationships: Causes and consequences. New York: Holt Rinehart & Winston, 1974.

Cooper, H. Intervening in expectation communication: The "alterability" of teacher expectations. Columbia, Mo.: Center for Research in Social Behavior, University of Missouri, 1978.

Cummings, W.K. Education and Equality in Japan. Princeton, N.J.: Princeton University Press, 1980.

Delefes, P. & Jackson, B. Teacher-pupil interaction as a function of location in the classroom. Psychology in the Schools, 1972, 9, (2), 119-123,

Efron, M.A. The impact of a teacher development program on teacher-student dyadic interactions (Doctoral Dissertation, Harvard University, 1976). Dissertation Abstracts Int'l, 1976, 37, (9A), 5756.

Good, T.L. Classroom expectations: teacher-pupil interactions. In McMillan, J.H. (Ed.) The Social Psychology of School Learning. New York: Academic Press, 1980.

Good, T. & Brophy J. Educational psychology: A realistic approach 2nd. Ed. New York: Holt, Rinehart & Winston, 1980.

Good, T. & Brophy J. Looking into Classrooms. 2nd Ed. New York: Harper & row, 1978.

Grant, A.F. Eighth grade students attitudes and perceptions toward the ten categories of Flander's system of interaction analysis: an exploratory study (Doctoral Dissertation, University of Oregon, 1971). Dissertation Abstracts Int'l, 1971, 32, (6A), 3003.

Horn, E. Distribution of opportunity for participation among the various pupils in classroom recitations. (Doctoral Dissertation, Columbia University, 1917) Comprehensive Index of Dissertations, 1961-1970.

Jackson, P. Life in classrooms. New York: Holt Rinehart & Winston, 1968.

Koneya, M. Location and interaction in row and column seating arrangements. Environment and Behavior, 1976, 8, (2), 265.

Laughlin, J. S. A sacred cow--class size. College and University, 1976, 51, 339-347.

Martin, M. Equal opportunity in the Clasroom ESEA, Title III: Session A Report. Los Angeles: County Superintendent of Schools. 1973.

McDonald, F. & Elias, P. The effects of teacher performance on pupil learning. Beginning Teacher Evaluation Study: Phase II, final report: Vol. I Princeton: Educational Testing Service, 1976.

Nevjahr, J.L. An analysis of teacher-pupil interactions when instruction is individualized (Doctoral Dissertation, Columbia University, 1970). Dissertation Abstracts Int'l, 1970, 31, (3A), 4041.

Porwell, P.J. Class-size: A summary of research. Arlington, VA: Educational Research Service, 1978.

Rosenthal, R. On the social psychology of the self-fulfilling: Further evidence of Pygmalion effects and their mediating mechanisms. New York: MSS Modular Publications, 1974.

Rosenthal, R. & Jacobson, L. Pygmalion in the Clasroom: Teacher expectation and pupil intellectual development. New York: Holt, Rinehart & Winston, 1968.

Ryan, D.W. and Greenfield, T.B. The Class-Size Question. Toronto: The Ministry of Education, 1975.

Schwebel, A. I., & Cherlin, D.L. Physical and Social distancing in teacher-pupil relationships. Journal of Educational Psychology, 1972, 63, 543-550.

Tversky, A. & Kahneman D. Belief in the law of small numbers. Psychological Bulletin, 1971, 76, 105-110.

Weinstein, C.S. The Physical Environment of the School: A review of the research. Review of Educational Research, 1979, 49, (4), 577-610.

Woodley, C.P. Interaction in the classroom: a classroom observation and analysis repertoire for teachers (Doctoral Dissertation, University of Colorado, 1971). Dissertation Abstracts Int'l, 1971, 32, (7A), 3877.